

§ 26.9 Specifications; all types of lighting systems.

(a) MSHA will not test or investigate any lighting system that in its opinion is not constructed of suitable materials, that evidences faulty workmanship, or that is not designed upon sound engineering principles. In addition to any specifications or requirements imposed by the regulations in this part, MSHA may impose such further specifications or requirements as in its opinion are necessary or proper to investigate or test the particular device submitted.

(b) Adequacy of design and construction will be determined in connection with the following factors: Kind and durability of materials, test of active parts, resistance to moisture, drop test, insulation measurements, durability of construction, practicality in operation, suitability for underground service, and performance characteristics during the investigation. Since all possible designs, arrangements, or combinations cannot be foreseen, MSHA reserves the right to make any tests or to place any limitations on equipment or parts of equipment not specifically covered herein to determine the safety of such equipment with regard to explosion and fire hazards.

(c) The following types of lighting fixtures will be considered: (1) Intrinsically safe, and (2) explosion proof.

(d) All components must be designed and constructed in such a manner that they will not create an explosion or fire hazard.

(e) All enclosures must be essentially of "drip-proof" design.

(f) All fixtures and related components in a lighting system must be so designed that the temperature of external surfaces will not exceed 390° F. (200° C.) at any point during continual operation.

(g) No certificate of approval will be issued for a lighting system if the electrical pressure (difference of potential) of the power supply exceeds 300 volts direct current or 260 volts alternating current at the input terminals of any lighting fixture.

(h) The clearances between live parts and casings shall be such as to minimize the possibility of electric arcs between them, or if space is limited, the

casing shall be lined with adequate insulation.

(i) Phenolic and other insulating materials that give off highly explosive gases when decomposed by heat, such as may be generated electrically, shall not be placed within enclosures where they might be subjected to destructive electrical arcing.

(j) All lighting circuits shall be provided with short-circuit protection. If distribution boxes are used for this purpose, they must conform with all of the applicable requirements of Part 18 of this subchapter (Schedule 2F) unless these distribution boxes are installed in fresh intake air. The circuit of each lighting fixture shall be protected against excessive overload currents.

(k) If an ungrounded system is used, which is electrically isolated from all other power circuits, fixtures and auxiliary equipment need not be frame grounded.

(l) If a grounded system is used, all cables must contain a separate grounding conductor to insure that all exposed conducting materials in the system will not exceed ground potential. A device that will disconnect all power from the system in case of a ground fault will meet this requirement.

(m) Power conductors must not be used for grounding.

(n) Lighting systems and fixtures shall be designed for hanging from supports, so that cables or components are not permitted to rest on the mine floor.

(o) All lighting fixtures must be provided with a lock or seal. Any other fastening that requires a special tool for its removal will be construed as an effective seal. In place of a conventional lock or seal, an electrical or mechanical interlock may be provided to prevent gaining access to the lamps with power on. Provision for removal of lamps without arcing or sparking will also be acceptable.

(p) Lighting fixtures must be so designed that vibration will not shake the lamps loose from their sockets or holders.

§ 26.10 Specifications; intrinsically safe lighting fixtures.

(a) Intrinsically safe lighting fixtures shall be so constructed that they will

withstand being dropped five times from a height of five feet on an oak platform in the presence of explosive methane-air mixtures. (In these tests Pittsburgh natural gas may be substituted for methane.) The safety elements of the fixture must function so that no explosion or fire hazard exists at any time during or after the tests. (Breakage of a fluorescent lamp will not in itself constitute test failure.)

(b) The fixture must be enclosed in an explosion-resistant housing that will afford mechanical protection and withstand a minimum of ten internal explosion tests in surrounding explosive atmospheres containing air with 7.0 to 10.0 percent of methane without (1) igniting the surrounding atmosphere, or (2) permanently distorting of any part of the fixture.

(c) Plastic material used in place of glass for lighting fixtures must not create explosion, fire, or toxic hazards when subjected to normal maximum operating temperatures.

§ 26.11 Specifications; explosion-proof lighting fixtures.

(a) All lighting fixtures that cannot be designed intrinsically safe shall be constructed strictly in accordance with the applicable requirements of Part 18 of this subchapter (Schedule 2F).

(b) Transparent plastics used in place of glass shall be of the thickness required of glass and shall not crack or shatter when struck by dripping cold water.

§ 26.12 Specifications; cable connectors.

(a) Connectors shall be constructed so as to afford a minimum of accessibility to live electrodes by any means other than the related plug.

(b) The material of which cable connectors are made must be equivalent to the insulation on the cables with respect to flame-resistant properties.

(c) Cable connectors shall meet the following requirements:

(1) A connector designed for a nominal 240-volt system shall be engaged and disengaged through 750 cycles under its rated load at 260 volts alternating current at 80 percent power factor.

(2) A connector designed for a nominal 120-volt system shall be engaged and disengaged through 750 cycles under its rated load at 130 volts alternating current at 80 percent power factor.

NOTE: The tests described in paragraphs (c) (1) and (2) of this section will be performed mechanically in the presence of explosive atmospheres containing air with 7.0 to 10.0 percent of methane. Ignition of the surrounding explosive atmosphere, destructive burning, distortion, and excessive temperature constitute failure.

(3) Under normal load, no part of any cable connector shall attain a temperature in excess of 175°F. during any of the prescribed tests.

(4) At 260 volts impressed, one cable connector shall be subjected to a short-circuit test at the maximum capacity of a 5 KVA transformer. The connector components will be mechanically engaged with the cable on the male portion short circuited at the plug. A time lag fuse of the maximum current rating of the connector will be connected in the circuit.

NOTE: The connector used for this test will be one already subjected to the cycling test described in paragraphs (c) (1) and (2) of this section.

Fusing of the contacts will constitute a failure.

(d) Cable connectors must be so designed that they will withstand a pull of 25 pounds without separating subsequent to the cycling tests described in paragraphs (c) (1) and (2) of this section.

§ 26.13 Specifications; portable cables.

(a) All portable cables shall have 600-volt insulation and shall have an outer jacket that is highly resistant to abrasion, moisture, and heat. They shall meet the flame-resistance requirements of Part 18 of this subchapter (Schedule 2F).

(b) The minimum conductor size acceptable for lighting circuits shall be No. 14 (AWG). In any case, cables must have conductors of a size equal to or greater than the National Electric Code standard. The current carrying capacity shall be based upon the maximum load that will be carried by the cables in normal service.